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ABSTRACT

This study investigated the underlying disorder of certain children who may have normal or above-normal intelligence, yet fail to read at levels appropriate to their ages. Twenty-two poor readers and 22 normal readers were matched on sex, age (7 to 12 years), and IQ (94 to 130). Examination of school records revealed that many poor readers were characterized as having short attention span, being immature in perceptual ability, being hyperactive, being immature in fine-motor ability, and behaving antisocially. In this investigation, two letters were presented simultaneously. Subjects responded by pressing one switch if the letters were the same, and another if different. Reaction time was found to be longer for poor readers. In addition, reaction times increased during testing and decreased after a rest more for poor than normal readers. Main effects for age and IQ were present. Correlations between initial reaction times and changes were significantly different for poor and normal readers. The results were interpreted as support for a theory that certain learning-disability children respond to laboratory tasks with suboptimal levels of arousal. References are included. (AW)

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Reaction Time in Learning-Disability and Normal Children

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Poor readers and normal readers were matched on age (7-12) and IQ (94-130). Two letters were presented simultaneously. Ss responded by pressing one switch if the letters were the same, and another if different. Reaction time was longer for poor readers. In addition, reaction times increased during testing, and decreased after a rest, more for poor than normal readers. Correlations between initial reaction times and changes were significantly different for poor and normal readers. Results are interpreted as support for a theory that certain learning-disability children respond to laboratory tasks with sub-optimal levels of arousal.

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The purpose of this study was to attempt to learn more about the underlying disorder of certain children who may have normal or above-normal intelligence, yet fail to learn to read at levels appropriate to their ages. Poor readers (N=22) and normal readers (N=22) were compared on a same-different reaction time task with visual stimuli.

Several hypotheses, derived from an arousal theory of individual differences, were investigated. It was assumed that: (a) there is an optimal level of arousal for best performance; (b) on either side of this point, performance is impaired; and (c) impairment of performance increases with distance from the point of optimal arousal. Evidence for U-shaped functions obtained with a variety of tasks and measures of arousal has been reviewed by Duffy (1962).

It was further assumed that certain learning-disability children respond to laboratory tasks with sub-optimal arousal, and that normal children respond with optimal or above-optimal arousal. Partially supporting this assumption are studies in which electrodermal measures of arousal were lower for learning-disability children than for normal controls (Boydstun et al., 1968; Satterfield and Dawson, 1971).

Finally, it was assumed that the arousal level of all Ss decreases during testing, and increases after rest. This last assumption is supported by many experiments in which the orienting reaction has been charted through habituation and recovery (Lynn, 1966).

The following hypotheses were derived from these assumptions. First, it was hypothesized that reaction times (RT) would be longer for poor readers. Second, it was hypothesized that a composite score of RT increment during testing and RT decrement after a rest (dRT) would be greater for poor readers. Third, it was hypothesized that the correlation of RT and dRT would be positive for learning-disability Ss, and negative for normal Ss. The last two hypotheses express the expected effect of a decrease in arousal level on the performance of Ss who initial arousal levels fall at various distances from the optimal level, and on different sides of the U-shaped function.

Poor and normal readers were selected from elementary schools and matched on age, total IQ (W.I.S.C.), and sex. Children in the group of poor readers were drawn from learning-disability programs, in which boys considerably outnumbered girls, as is common. Children taking psychoactive medication, or with known visual or auditory disorders, were excluded. Age in the group of poor readers ranged from 7 to 12 years, and IQ ranged from 94 to 130. Examination of school records revealed that many poor readers were characterized as having short attention-span (68%), being immature in perceptual ability (63%), being

hyperactive (50%), being immature in fine-motor ability (73%), and behaving anti-socially (41%).

Two upper-case letters were presented simultaneously. Ss were required to respond by pressing one switch if the letters were the same, and another if different. A trial was the presentation of a same or different letter-pair. After practice, Ss were given 80 trials, followed by a ten-minute rest, followed by 40 trials. Equal numbers of same and different pairs, randomly sequenced, were presented. Ss were instructed to respond as fast as possible, minimizing errors. Latencies to respond correctly were analyzed. A separate analysis of error data demonstrated no significant difference between groups.

Stepwise linear regression revealed that RT was significantly longer for poor than normal readers, as hypothesized ($p < .001$). In addition, there were main effects for Age ($p < .001$) and IQ ($p < .05$). Group X Age, and Group X IQ interactions were not significant. A separate analysis revealed that dRT was significantly greater for poor than good readers, as hypothesized ($p < .01$). Other main effects and interactions were not significant.

Product-moment correlations of initial RT and dRT were computed separately for poor and normal readers. Initial RT scores were corrected for Age and IQ by computing appropriate partial correlations. The partial correlation of initial RT and dRT for poor readers was positive and significant, as hypothesized ($p < .025$). The partial correlation for normal readers was negative, as hypothesized, but not significant. The difference, was, of course, highly significant ($p < .005$).

Results are interpreted as support for the theory that certain learning-disability children respond to laboratory tasks with less arousal than normal children. Future investigations will monitor autonomic indices of arousal. It is hoped that results will lead to diagnostic techniques for predicting the efficacy of various therapies, including psychoactive medication, for individual children.

REFERENCES

Boydstun, J., et al. Physiologic and motor conditioning and generalization in children with minimal brain dysfunction. Conditional Reflex, 1968, 3, 81-103.

Duffy, E. Activation and Behavior. New York: John Wiley, 1962.

Lynn, R. Attention, Arousal and the Orienting Reaction. London: Pergamon Press, 1962.

Satterfield, J. H. and Dawson, M. E. Electrodermal correlates of hyperactivity in children. Psychophysiology, 1971, 8, 191-197.